

What is claimed is:

1. A process for the enzymatic synthesis of polyol acrylates, in which an aliphatic polyol is reacted with an acrylic acid compound or an alkyl ester thereof in bulk or in a liquid reaction medium comprising an organic solvent, in the presence of an enzyme which transfers acrylate groups, and after the end of the reaction the polyol acrylate(s) formed is(are) isolated if desired from the reaction mixture.
- 5 2. A process as claimed in claim 1, wherein the liquid reaction medium has an initial water content of less than about 10% by volume.
- 10 3. A process as claimed in either of the preceding claims, wherein acrylic acid compound and polyol are used in a molar ratio of about 100:1 to 1:1.
- 15 4. A process as claimed in any of the preceding claims, wherein the acrylic acid compound is selected from acrylic acid, lower-alkyl-substituted acrylic acid, and the alkyl esters of these compounds, and also mixtures thereof.
- 20 5. A process as claimed in any of the preceding claims, wherein the polyol is selected from straight-chain or branched or carbocyclic, saturated or unsaturated hydrocarbon compounds having at least 3 carbon atoms and at least 3 (esterifiable) hydroxyl groups in optically pure form or as a stereoisomer mixture, or mixtures of different polyols.
- 25 6. A process as claimed in claim 5, wherein the polyol is selected from straight-chain, branched or cyclic saturated hydrocarbons having 3 to 30 carbon atoms and from 3 to 10 hydroxyl groups.
- 30 7. A process as claimed in any of the preceding claims, wherein a completely acrylated polyol acrylate is added to the reaction medium, the polyol acrylate being the ester of an acrylic acid compound and a polyol as defined in any of the preceding claims.
- 35 8. A process as claimed in any of the preceding claims, wherein the polyol is selected from glycerol, diglycerol, triglycerol, 1,2,4-butanetriol, trimethylolmethane, trimethylolethane, trimethylolpropane, trimethylolbutane, 2,2,4-trimethyl-1,3-pentanediol, pentaerythritol, ditrimethylolpropane, dipentaerythritol, tripentaerythritol, D-, L-, and mesoerythritol, D-

and L-arabitol, adonitol, xylitol, sorbitol, mannitol, dulcitol and inositol, and also the mixtures and alkoxylates, preferably ethoxylates and/or propoxylates, thereof.

9. A process as claimed in either of the preceding claims, wherein the enzyme is selected from hydrolases, preferably esterases (E.C. 3.1.-.-), such as especially lipases (E.C. 3.1.1.3), glycosylases (E.C. 3.2.-.-), and proteases (E.C. 3.4.-.-) in free or immobilized form.

10. A process as claimed in any of the previous claims, wherein the organic solvent is selected from C<sub>1</sub>-C<sub>6</sub> alkanols, pyridine, polyalkylene glycol dialkyl ethers, alkylene carbonate, C<sub>1</sub>-C<sub>6</sub> alkyl alkanecarboxylic esters, acetone, 1,4-dioxane, 1,3-dioxolane, THF, dimethoxymethane, dimethoxyethane, and mixtures thereof.

15. A process as claimed in any of the previous claims, wherein the enzyme content of the reaction medium is in the range from about 0.01 to 10% by weight, based on the polyol used.

20. A process as claimed in any of the previous claims, wherein the reaction temperature is in the range from 0 to about 100°C.

25. A process as claimed in any of the previous claims, wherein the reaction medium is single-phase or multiphase and wherein the reactants are present in solution, suspension or emulsion.

30. 14. A process as claimed in any of the previous claims, wherein alcohol produced during the transesterification or water of reaction produced during the esterification is removed from the reaction equilibrium.

15. A process for preparing polymeric polyol acrylates, wherein at least one polyol acrylate is prepared by a process as claimed in any of the previous claims, separated if desired from the reaction mixture, and polymerized if desired together with further comonomers.

35. 16. A process as claimed in claim 15, wherein a reaction product comprising substantially polyol monoacrylates is reacted with at least one comonomer to form a linear copolymer.

17. A polymeric polyol acrylate obtainable by a process as claimed in either of claims 15 and 16.

18. A polyol acrylate obtainable by a process as claimed in any of claims 1 to 14.

5

19. A polyol acrylates as claimed in claim 18 containing from about 60 to 100 mol%, based on the total molar number of polyol acrylate, of compounds having both alcohol functionalization and acrylate functionalization.

10 20. The use of a polymeric polyol acrylate as claimed in claim 17 for the preparation of coating materials, such as especially radiation-curable and/or thermally curable coating materials.

15 21. The use as claimed in claim 20, wherein the coating materials have a total extractable fraction, in particular after thermal curing, of less than 20% by weight.

22. The use as claimed in either of claims 20 and 21, wherein after thermal curing alone the coatings are not tacky.